PERFORMANCE NEWS

LMT • TOOLS

BELIN
FETTE
KIENINGER
ONSRUD

in alliance

BILZ
BOEHLERIT

Experience Performance: Live

Dear Reader,

Welcome to the current issue of LMT Performance News, which is appearing promptly for EMO 2011. The following pages present extensive information on topics that concern our industry and our companies.

Under the motto "Experience Performance" this issue of our magazine would like to vividly and clearly illustrate how you can improve your productivity with the aid of our tool solutions. That's why Performance News does not only present our views, but also allows industry experts and users to express their opinions in depth.

You will find even more information – including, among other things, a number of live demonstrations of our tools – on our website at www.lmt-tools.de. We cordially invite you to pay us a visit and make up your own mind – at our fair booth, in conversation with our colleagues in sales or on the Internet. Feel free to contact us – we look forward to meeting you!

Yours sincerely,

Alessandro Telesio
Managing Director,
LMT Tool Systems GmbH

QR codes take you directly from our magazine to the Web

lmt.e-convention.net

You will find so-called Quick Response codes (or QR codes, for short) at various places in this issue of Performance News. These codes contain links to Web pages that present further information about the subject of the respective article, such as fact-sheets, videos, user reports and contact information.

To use this service, you need a smartphone and an appropriate "app" that can read the QR Code. If you don't have one, conduct a search for a "QR Reader" in your app store. Then simply launch the new app and you will be able to seamlessly move from the magazine to the Internet!

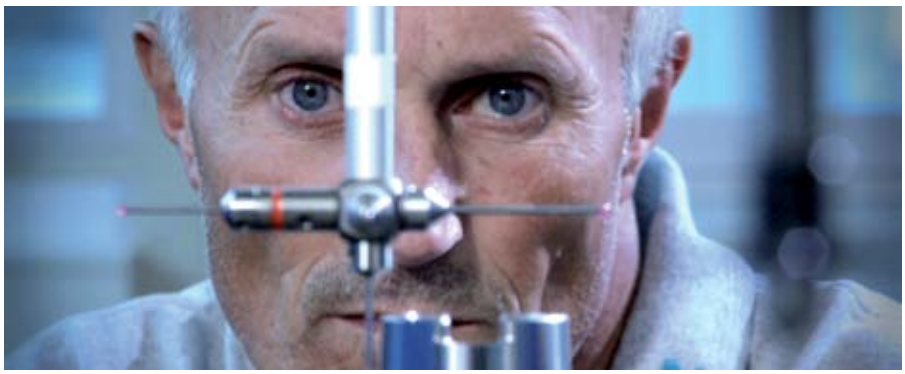
Contents

Caught between innovation and cost pressures

Where is tool technology heading?

// Following the 2009 economic crisis, demand for and sales of precision tools have increased significantly and prospects for the future remain promising. However, industry experts all agree that tool sales will decline relative to machining volumes in the future. Tool manufacturers face increasing pressure to innovate due to the use of new materials and alternative machining techniques, while they also being subjected to cost pressures due to rising raw material prices.

Things are looking up for German industry. Incoming orders in the German engineering sector rose by more than 30% between spring 2010 and March 2011. The manufacturers of precision tools were also able to move ahead in 2010 and, according to the VDMA, increased their production by 23%. In all, they produced tools worth over 9 billion euros and 27% of these were cutting tools. The industry expects further growth of approximately 15% in 2011.
Nevertheless, industry experts all agree that tool consumption will decline relative to machining volumes in the future. Today higher performance tools already enable users to achieve higher productivity with fewer tools as a result of improved cutting materials, coatings and geometries. Furthermore, many areas of application with traditionally high levels of tool consumption are disappearing as a result of the increased use of lightweight materials. The message for tool manufacturers is clear: today's tools will not be the tools of the future.



Focusing on innovation: New tools guarantee increased performance.

Automotive and wind power industries drive innovation

The automotive industry's influence on tool technology is traditionally great. Mobility is in demand worldwide. While statistically one in two inhabitants of Germany and the USA already owns a car, there is only one car for every twenty inhabitants of China – the growth potential there is enormous. This is also reflected in global automobile production: according to the International Organization of Motor Vehicle Manufacturers, 26% more cars were produced in the post-crisis year of 2010 than the year before, and the German Association of the Automotive Industry (VDA) is predicting growth of another 8% in 2011. Accordingly, tool demand is also increasing. Since manufacturers across all industries are using more and more plastics and composite materials and automobile trends such as lightweight design, miniaturization and electromobility are influencing development, there is a growing demand for new, even more powerful tools specially tailored to specific applications.

Wind power is another industry that could have a similarly strong influence on the future of tool technology. The main reason for this is the massive expansion of alternative energy production. The steadily increasing absolute volume of material to be machined and the machining of alternative materials will also have an impact. Irrespective of the industry concerned, tool manufacturers can play an interesting and significant role. At the interface between machine and workpiece, tools have a decisive influence over the productivity of the entire machining process.

Raw materials as a cost factor

So while manufacturing industry and therefore also tool manufacturers have no lack of orders, extremely high raw material prices are currently creating additional cost pressures and increasing the pressure to innovate. For example, the price of ammonium paratungstate (APT), an important material in tool production, has almost doubled since September 2010 . APT is used to produce tungsten carbide, which in turn makes up 85% of the carbide or hardmetal used in high-performance tools. Since alloy steel is also becoming steadily more expensive, the prices of tools made of high-performance HSS are also rising. Tool manufacturers are responding to this in a variety of ways that include developing alternative cutting materials and coatings as well as new tool strategies that make it possible to replace tool parts that wear out. The reconditioning of used tools is also becoming more and more important.

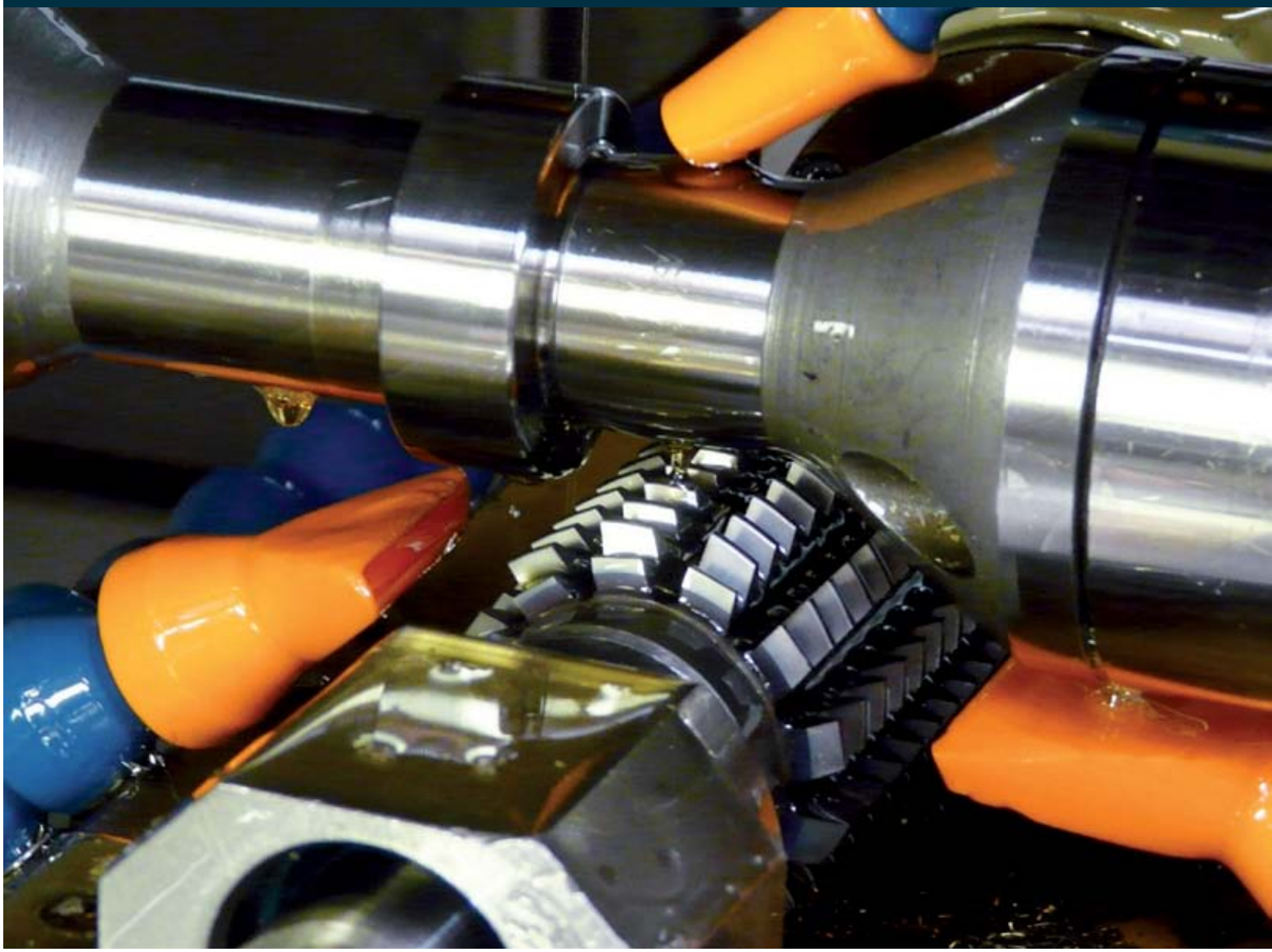
Where is tool technology heading?

Strong growth, especially in the automotive and wind power industries, will ensure sustained high demand for precision tools during the next ten years. The increasing use of new materials, which will also have an impact in other industries in the medium term, will reinforce the demand for new tools. It will therefore be essential for tool manufacturers to quickly transform innovations into marketable products, to establish them in practical use in collaboration with the suppliers of machine tools and to support users worldwide with carefully targeted service products.

Gearwheel production

A class of its own

// Gearwheel production often means mass production. In the automotive industry, for example, the main components for gearboxes are required in huge quantities. Accordingly, if there is an increase in car production, the demand for gearwheels rises exponentially. So how can automotive suppliers open up new production capacities in such situations – while simultaneously minimizing the production costs of their components? Gearwheel experts from LMT Tool Systems have demonstrated one way of doing just that with its customer Stelter Zahnradfabrik. Stelter was able to free up machine capacities simply by deploying the new SpeedCore hob. The tool's incredible performance eventually tipped the balance for the company.



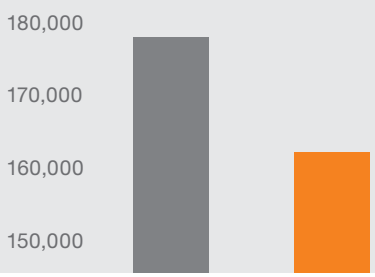
LMT SpeedCore increases gear hobbing productivity by at least 30%.

The specialists at Stelter have known for decades that the production of gearwheels is a high-precision business. Its customers include international engineering, energy and automotive companies. Very different products ranging from enormous gears for wind turbine transmission systems to the smallest of cogs with a diameter of eight millimetres are all produced at the company's site in Bassum near Bremen. However, all these components share Stelter's high quality standards: high technology and specialist know-how ensure a zero-fault strategy. Permitted production tolerances are minimal for every single gearwheel.

Focus on tools

It should therefore go without saying that Stelter subjects gear-cutting tools to extremely close scrutiny. They must not only meet the company's high quality standards, but also enable efficient, high-speed production. It is not very surprising then that production planners very quickly initiated performance tests with the SpeedCore hob after it was launched by LMT Fette in June. After all, the performance claims made by LMT's tool experts in the run-up to the launch were rather amazing: higher cutting speeds enable users to increase productivity by over 30% compared to hobs made of powder metallurgical high-speed steel. According to the LMT developers, this increase is made possible by a new cutting material that forms the core of the hob and facilitates much higher cutting speeds.

FALLING TOTAL COSTS



PM tool 177,305 euros | **SpeedCore 161,889 euros**

A simple calculation shows the difference: if your machine costs are 90 euros an hour, total costs (machine costs plus tool costs) fall significantly.

Massive productivity hike

Were these claims confirmed by the customer? "Absolutely," explains Karl-Heinz Wilkens, production manager at Stelter. "These incredible performance figures were also substantiated in production tests on a gearwheel with module 1.71." Compared with the previously used PM-HSS tool, it was possible to increase the cutting speed from 150 to 225 metres a minute. The machining time per workpiece was thus reduced from 0.54 to 0.35 minutes. "When you consider that this gearwheel is produced in enormous batch sizes and the machinery is in operation for 24 hours a day, 6 days a week, you begin to realize what kind of possibilities the SpeedCore hob opens up. When it comes down to it, significantly higher numbers of gearwheels can be produced in the same time on the same machine," adds Torsten Oellers, gear-cutting application engineer at LMT Fette.

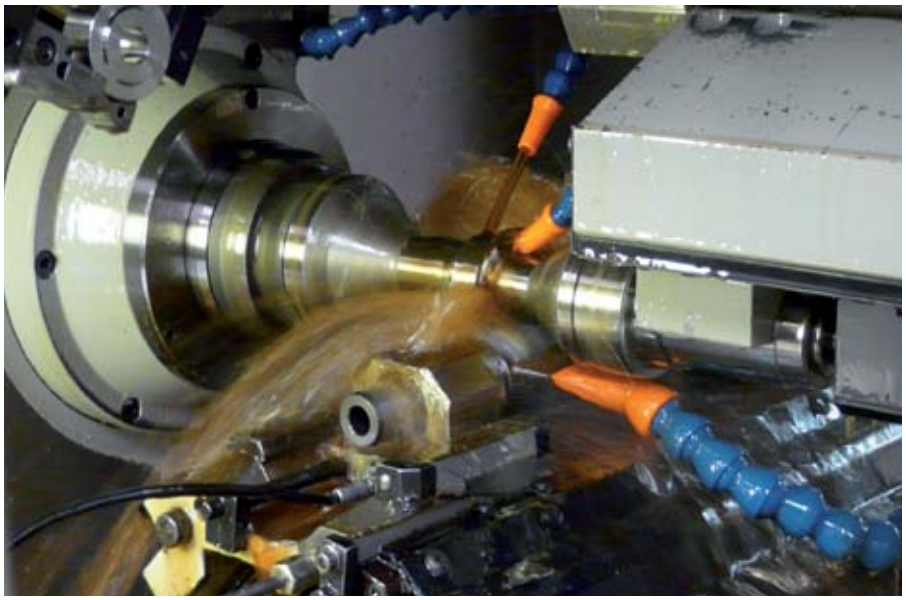
Reconditioning and recoating at LMT

LMT offers a complete system package for the production of gearwheels. It also

SPEEDCORE: A GENERAL COMPARISON OF COSTS

LMT tool specialists intend to set new efficiency standards in gearwheel production with this innovative cutting material. A general comparison of costs by developers at LMT explains how this is done. If your costs are 90 euros an hour, the machine costs for a production run of 100,000 components with module 2.7 decrease from roughly 154,000 euros to 134,000 euros because of the reduction in machine time per workpiece. "Even if the investment cost for a SpeedCore hob are a little higher than a simple PM-HSS hob, changing over to the new tools pays for itself very quickly because the savings potential is so enormous, explains Thomas Falk, head of the gear-cutting segment at LMT Tool Systems. In concrete terms, the above example results in a reduction of total annual costs, including tool costs, from roughly 177,000 euros to just under 162,000 euros (see diagram).

Video: Product film SpeedCore



The SpeedCore hob is now in use at Stelter. Compared to the previously used conventional PM-HSS gear hob, the machining time per workpiece has fallen from 0.54 to 0.35 minutes.

includes specific engineering and a range of services. With sites in Germany, the USA and China, LMT guarantees the global reconditioning of its hobs to original manufacturer quality. Stelter, for example, also makes use of this expertise: SpeedCore hobs used by the gearwheel specialists are reconditioned and recoated at the LMT Fette plant in Schwarzenbek near Hamburg. "The system package perfectly matches the possibilities offered by the SpeedCore hob," explains Thomas Falk, head of the gear-cutting segment at LMT Tool Systems. "It offers unique opportunities, especially when it comes to fully exploiting gear production potentials and increasing production volumes. Increased demand in many sectors is therefore opening up considerable market opportunities for SpeedCore."

SPEEDCORE: CUTTING MATERIAL IS ESSENTIAL

Higher cutting speeds increase the mechanical and thermal loads of the hob. The HSS materials are limited to a range of cutting speeds due to their limited high temperature hardness. The new SpeedCore hobs from LMT Fette are manufactured out of a new cutting material which overcomes the barriers of high temperature hardness.

SpeedCore is made out of carbon-free iron Cobalt and Molydenum. This new composition as well as the powder metallurgy manufacturing method allows an increase in high temperature hardness of the material compared to the traditionell PM-HSS materials. The hardness of this material is generated by special nanostructures, which are in a intermetallic state.

Keeping the world turning

// Without gearwheels propulsion technology would come to a standstill. Whether in car gearboxes, wind turbines or other machinery, manufacturers worldwide produce these essential components by the billion.

The history of the gearwheel goes back a long way – Aristoteles first mentioned the direct connection of two (wooden) wheels as long ago as 330 BC. A great deal has changed since then, also in terms of production. In modern manufacturing the goals are practically always the same: whether worm gears, spur gears, bevel gears, helical gears or crown gears for transmission systems of all kinds – the faster and cheaper manufacturers can produce them at higher quality, the better. One of the most important machining production techniques for gearwheels is hobbing. It is extremely efficient and guarantees both high precision and optimal surface quality. That's important because the precision of the components determines how efficiently force is transmitted and – in the case of car transmission systems – whether a gearbox runs smoothly and quietly.

LMT Fette is making a major contribution in this field by developing and producing hobs and other gear-making tools. The gear specialist has now been advancing tool development for almost 100 years. The SpeedCore hob generation demonstrates this clearly as its latest innovation: the tool's core is made of a new kind of intermetallic cutting material that enables significantly higher cutting speeds than conventional PM-HSS substrates. Read all about it on the page opposite.

PDF: Gear cutting experts (ca. 0,5 MB)

Interview

“The combination of cutting material and coating is decisive”

// Hobbing is one of the key processes in gearwheel production. Performance News spoke with Professor Bernhard Karpuschewski, Managing Director of the Institute of Manufacturing Technology and Quality Management (IFQ) at Otto von Guericke University in Magdeburg, about the requirements for the best gear-cutting tools and the future of gearwheels in the coming age of electromobility.

→ Professor Karpuschewski, what are users particularly concerned about in gear cutting?

Quality is the decisive factor. You can already see that in everyday life. A vehicle gearbox failure only occurs under extreme conditions, such as Formula One racing. In all other applications – from the aircraft industry to wind turbine transmission systems – gear failure is simply not accepted. At the same time, manufacturers face enormous cost pressures. The goal therefore is always the optimum combination of quality and productivity.

→ How do users achieve this ideal combination?

By using the most up-to-date tools, machines and manufacturing processes. In the case of gearwheel production that involves hobbing. It is the most productive technique and simply irreplaceable in the production chain.

→ What lines of development do you currently see in relation to hobs?

Development is very clearly heading in the direction of tailormade coatings combined with the best possible cutting material. A second trend is dry machining. Making do without cooling lubricants enables us to take into account ecological aspects of manufacturing.

→ You were involved in the development of the SpeedCore cutting material. What role did you play in that project?

We supported LMT, among other things, with specialized tests. The advantage of the process we used is that it enables you to make reliable forecasts about the performance of the entire hob cutter on the basis of the results of machining with only one or two teeth. This saves time and money.

→ What potential do you see for the new cutting material?

When it comes to performance, this cutting material bridges the gap between conventional PM-HSS and carbide, but is as durable as HSS in practical use. SpeedCore is therefore easy to handle and significantly cheaper. That is a unique combination with very good prospects of success.

→ In conclusion, let’s look into the future. What are the prospects for the gearwheel in the age of electromobility?

We will continue to use gearwheels very long into the future. It will certainly remain a fixture in the automobile, even when alternative propulsion systems are used. In addition, gears play a decisive role in wind energy. And gearwheels and turbines could even make a comeback in the aviation industry. There are serious proposals for turbines with planetary gears. The prospects are thus excellent.

→ Professor Karpuschewski, thank you for this interview.

→ www.ifq.ovgu.de

→ **Video: High-speed film of single tooth tests and gear cutting with SpeedCore**

RC 4014 axial rolling head

Filling a gap

// Fast processes, high-precision threads, perfect surfaces – the advantages of thread-forming with LMT Fette rolling systems are overwhelming. But what are you supposed to do when there isn't enough room available around an external thread – for example, at the bolt on a common rail pipe – and the rolling head is too large? LMT Fette is offering the perfect solution for this and similar threading tasks in the shape of the new RC 4014 axial rolling head.

An external thread can be formed on a nozzle or a rod in roughly two seconds using a rolling head. In the process the tool is moved axially over the component. Applying enormous forming pressure, the thread rollers work along the workpiece. In addition to this technique's incredibly short cycle times, there are a number of economic advantages: tool life is very high and production quality is exceptional.

Thread rolling in the smallest space

One special challenge arises, however, when there is very little space available around the external thread. Take a common rail pipe, for example. These components have several bolt immediately next to each other with little distance between them. Conventional rolling heads could not be used for such applications in the past, because a tool with a diameter of approximately 100 millimetres would not fit in the space between. "The gap is simply too small. So instead other processes had to be used, often cutting techniques, which, however, have disadvantages with regard to the surface quality of the thread and the processing time," says Tilo Knobelsdorff, who is responsible for the development of thread rolling tools at LMT Fette. "That was also why there was a concrete customer request for a smaller, much more compact rolling head that can be used on a common rail pipe."

So the experts decided to enter this new territory. The existing standard tool was reduced in diameter from 100 to only 40 millimetres. A special challenge here was the tool's mechanism. In a standard model,

There is not much room between the threads on the common rail pipe, but the compact axial rolling head fits "between them".

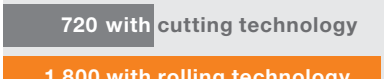
it ensures that the thread rollers inside the rolling head open after the thread rolling process to allow the tool to be withdrawn from the finished thread without making further contact. "This solution is very difficult to realize in such a compact rolling head. Its mechanical components would have to be much smaller and more delicate. However, that would have a negative impact on the system's stability – and that is unacceptable in a rolling head. After all, this system has to withstand extremely powerful forces," explains Knobelsdorff.

Small rolling head with great market potential

LMT Fette's solution is as simple as it is effective: the new RC 4014 axial rolling head makes do without the conventional mechanism to open the rollers. Instead the tool is simply removed from the thread in the opposite direction after the forming process. In order to do that the tool must be able to turn in both directions on the machine. "That's not a problem for modern CNC equipment," says Knobelsdorff. All the advantages of thread rolling remain untouched: it is possible to produce an M14x1.5 thread with a length of 12mm in less than two seconds – with a polished, burr-free surface. "The result is far superior to using a cutting process for all the well-known reasons," reports Knobelsdorff.

That's why the developers at LMT Fette believe in the market potential of the new rolling head. The ultracompact model enables the use of this successful process in a raft of new applications. It is the ideal solution whenever space around the thread is in short supply – for example, in the case of U-bolts with closely-spaced arms. "There's a trend towards miniaturization in many sectors and we have added a new chapter to this story in tool technology. It will open up new possibilities for the production of compact and small threaded components," concludes Knobelsdorff. One thing is certain: the development of especially compact rolling heads will continue. LMT Fette already plans to produce further models in the "RC" tool series ("Rolling Compact") with different tool diameters and thread dimensions.

FAST THREADS



Speed comparison
Thread rolling versus thread cutting
in threads per hour

RC 4014

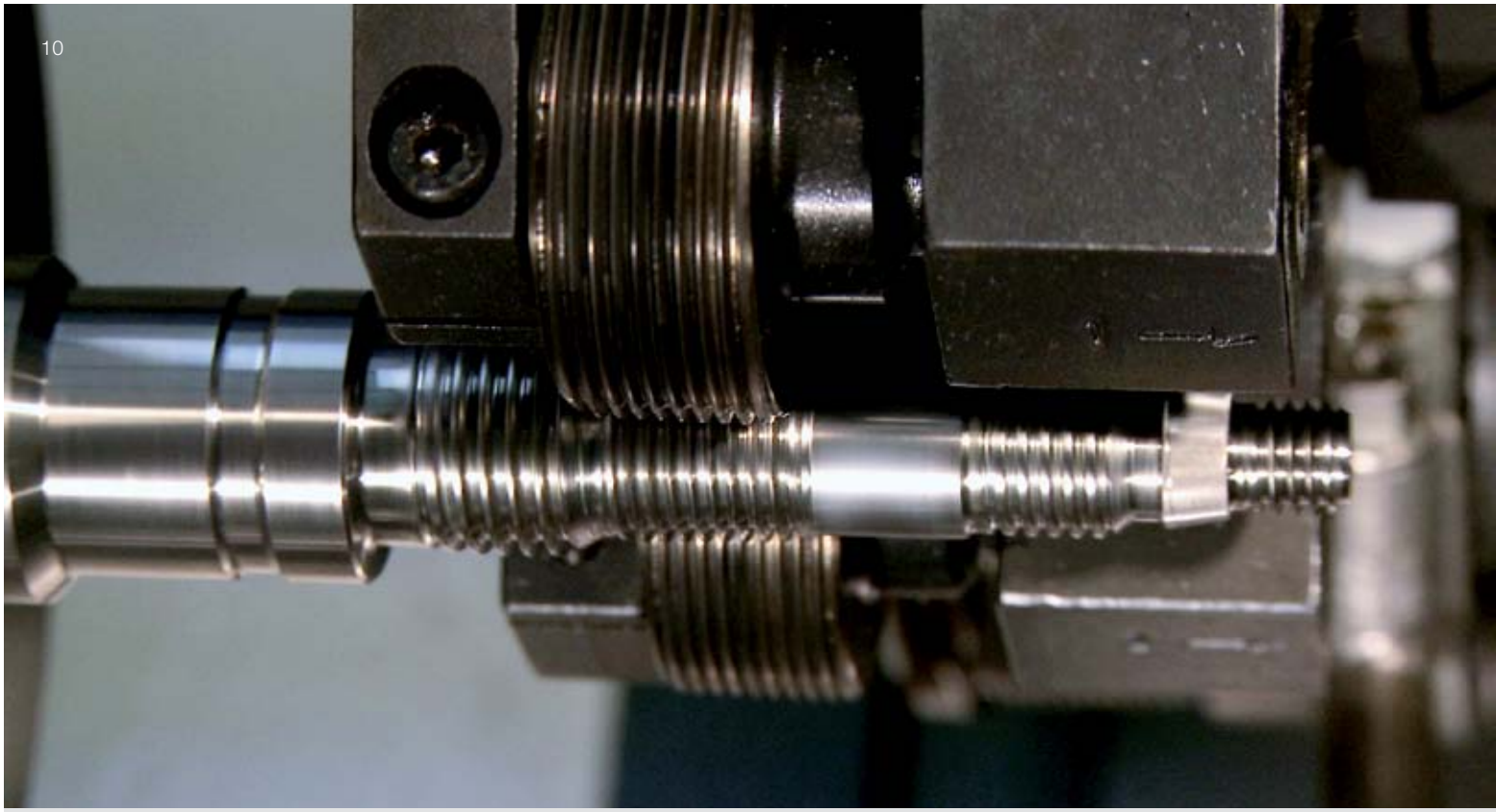
The advantages at a glance:

- High level of tool stability despite compact design
- Requires extremely little space during forming
- Minimum cycle times, perfect product quality
- Simple and easy setup
- Thread rollers can be used on both sides – result: doubling of tool life
- Significantly reduced processing times compared to cutting systems
- High-quality thread as a result of chipless forming process

Questions about rolling? We are happy to answer your questions on the phone or by email:

→ **Rolling head hotline: +49 4151 12-391**
→ **E-Mail: teamrollen@lmt-tools.com**

→ **Video: High-speed film of thread rolling**



Thread production

Protec just keeps on going

// Thread production on an industrial scale always involves high standards both in terms of quantity and quality. After all, it is not just a matter of machining large numbers of components. At the same time, each individual thread has to be produced to a high level of precision. What is more, this has to be achieved with increasingly demanding, high-tensile materials. The situation is no different at the IBMO company: among other things, the Polish automotive supplier manufactures brackets for car trailer axle mounts. LMT Fette's new Protec thread roller enables significantly lower tool costs and higher productivity.

When you hear where this IBMO product is used, you immediately know it presents difficult challenges: these solid brackets form part of the mountings for trailer axles that are used to transport boats. As a result, these components are made of high-tensile heat-treated steel to guarantee the necessary stability. However, this job does not involve just one type of bracket manufactured on the spot in Poland. The components and their threads vary considerably depending on the size and type of trailer. "In other words, two factors come together at IBMO that are typical for chipless thread production with thread rollers," explains Dirk Marbs from Technical Customer Service at LMT Fette. "On one hand, it is important that the threads on the component are produced with great precision, in large numbers and, of course, fault-free. On the other hand, there is also a need for flexibility. Varying kinds of threads and different batch sizes are often produced on

one machine. These factors also present a special challenge for the tools used."

The fact that IBMO decided to use LMT Fette's new thread roller with Protec coating was also influenced by its earlier experiences with this forming process, as Waldemar Michalak, CEO of IBMO, makes clear: "In the past we produced roughly 10,000 brackets – in other words, 20,000 threads – with one set of tools. The used rollers then had to be changed, which naturally increased tool costs substantially. As a result, we were looking for an alternative." LMT Fette tool specialists were able to offer a tailor-made solution with Protec thread rollers. Produced using thin-film technology, the Protec coating adheres strongly to the roller surface and protects the entire roller against the enormous pressure created by the rolling process. The thin-film coating reacts elastically and optimizes the rolling process as a result of its favourable frictional properties. In addition, the LMT coating experts tailored it to cope with the special loads that occur when working with hard materials from 900 N/mm². "The results of these efforts can be seen at LMT customers like IBMO," says Blazej Szala, application engineer at LMT Poland. "Protected by the coating, tool life increases massively." In fact, it is now possible to produce up to 30,000 brackets and therefore 60,000 threads with one set of Protec tools. That represents a threefold increase in comparison to the previously used rollers. There is thus a significant reduction in the total number of tools needed – and in tool costs.

Developed for high-tensile materials

This huge success comes as no real surprise to the thread rolling experts at LMT. Karl Wulftange, head of the Rolling Segment at LMT Tool Systems, explains: "In the course of developing Protec we specifically aimed to transfer the advantages of thread rolling, such as excellent surface quality and perfect thread geometries, to the shaping of high-tensile materials." This type of work had been possible before using chipless techniques, but the relevant tools had relatively short service lives due to the heavy loads involved. This therefore results in a kind of "Protec effect" for users. The thread rollers are increasingly being deployed where they are particularly needed – in the manufacture of workpieces whose threads and material will be subjected to high pressures in subsequent use. "That's why we expect this tool to have great market potential. High-tensile materials have long since become standard in many sectors. Protec-coated rollers now offer users the opportunity to benefit from the great advantages of this process while also reducing tool costs," says Wulftange.

PROTEC: PROTECTIVE SHIELD FOR THREAD ROLLERS

LMT Fette is presenting the world's first coating for thread rollers. The new Protec coating enables an additional performance boost for non-cutting thread production. Tool life can be prolonged significantly.

The Protec coating, which is produced using thin-film technology, adheres firmly to the roller surface and protects the entire head against pressure, ensuring significantly longer tool life. This thin-film coating behaves elastically and flexibly. Additionally, it optimizes the rolling process by improving friction properties. LMT coating experts have tailored the new layer for the specific strains of processing hard materials from 900 N/mm² upwards.

When deployed at IBMO, the LMT thread roller with Protec coating achieved a threefold increase in tool life.

Blazej Szala, application engineer at LMT Poland, IBMO CEO Waldemar Michalak and Arkadiusz Bober, machine tool operator.

IBMO produces large quantities of each of its different axle mount brackets.

PDF: Flyer Protec Power (ca. 1 MB)

High-quality car components

Perfect aluminium surfaces catch the eye

// What makes a car fascinating? Why is it fun to drive? Of course, the acceleration, the smooth purring of wheels and even the noise of the engine all play a role. However, an appealing interior design is just as important as the driving experience. Faurecia Angell-Demmel produces components that have a major impact on the appearance of car interiors: the international automotive supplier is a market leader for high-quality components with genuine metal surfaces – ranging from individual switches to entire consoles.

Teamwork for an optimal composites production solution (left to right): Andreas Winkler (LMT Sales South Germany), Sebastian Weber (machining process optimization, Faurecia) and Heiko Simonis (application engineer in Segment Composites & Plastics Machining).

A project at the plant in Kennelbach near Lake Constance proves that the successful machining of components does not depend solely on using the "right" tool. Efficient production processes and high component quality were achieved through active cooperation with the application specialists at LMT Tool Systems.

Every day, Faurecia Angell-Demmel products – for example, high-quality aluminium trim for doors and instrument panels – catch car drivers' eyes. These brushed, smooth or coated metal surfaces have to meet the very highest quality standards and integrate perfectly into the interior of the respective model.

Enormous increase in tool life

The decorative aluminium panels produced at the Kennelbach site are created in a complex manufacturing process. The material itself presents a real challenge for machining experts because the aluminium surface conceals a glass-fibre reinforced thermoplastic based on a copolyamide, and both layers of material have to be machined at the same time. "An LMT Belin special coated tool with left-hand helix eventually provided the perfect solution," explains Heiko Simonis, application engineer at LMT Tool Systems. "The tool was developed to deal with the specific requirements of this sandwich material and guarantees perfect surfaces and edges without burrs." However, quality was only one aspect of the job. The high quality standards have to be secured with a high level of continuity over the longest possible tool life. This was where LMT Tool Systems special expertise in coatings came into play. The carbide substrate, the coating and the microgeometry of the tool were steadily optimized until it eventually became possible to double the operating life of this specialized tool: they now only need to be changed after 30 to 50 machining operations on high-precision components.

Cooperation was crucial

Active cooperation between LMT Tool Systems and Faurecia Angell-Demmel was a crucial factor in the project's success. Application specialists from both companies worked together on site to find the ideal production solution. Cutting parameters, rotation speeds and even the direction of the cutter on the component were all optimized. "Numerous factors play a role when you're processing aluminium composites in a machining centre. For example, you have to find the perfect angle at which the tool enters the material," explains Sebastian Weber, machining technician at Faurecia Angell-Demmel. "Combining our process and plant know-how with the tool expertise of LMT Tool Systems was decisive. The machine was programmed and set up perfectly. The result is qualitatively perfect components and an economically optimized production cycle."

→ **www.angell-demmel.de**

The perfect production of spectacles by IC! Berlin is a matter of microns.

Machining plastics

Premium eyewear requires specialized tools

// Unique designs, top quality materials, faultless finishing – the familiar slogans of the car industry could equally well be applied to other sectors. A good example of this is the production of eyewear by the innovative ic! Berlin company. LMT Belin contributes its expertise as a specialist in machining plastics.

The fact that ic! Berlin wants to make exceptional products becomes obvious at the very first glance: this innovative company designs, develops and produces eyewear that is impressive because of its ingeniously simple, screwless hinge system and extravagant appearance. Glasses by ic! Berlin are not mass-market goods, but premium products for the discerning customer. However, these ambitious criteria also present challenges in production: the perfect processing of lenses and frames is measured in microns with absolutely no margin of error. At the same time, the materials that have to be machined under these conditions are especially high-value plastics and acrylic. "The required specialized know-how about the production of eyewear is only availabe from a very few tool manufacturers worldwide," explains Martin Rechtziegler, technical consultant at LMT Tool Systems. LMT Belin, the French company based in Lavancia, is one of these manufacturers.

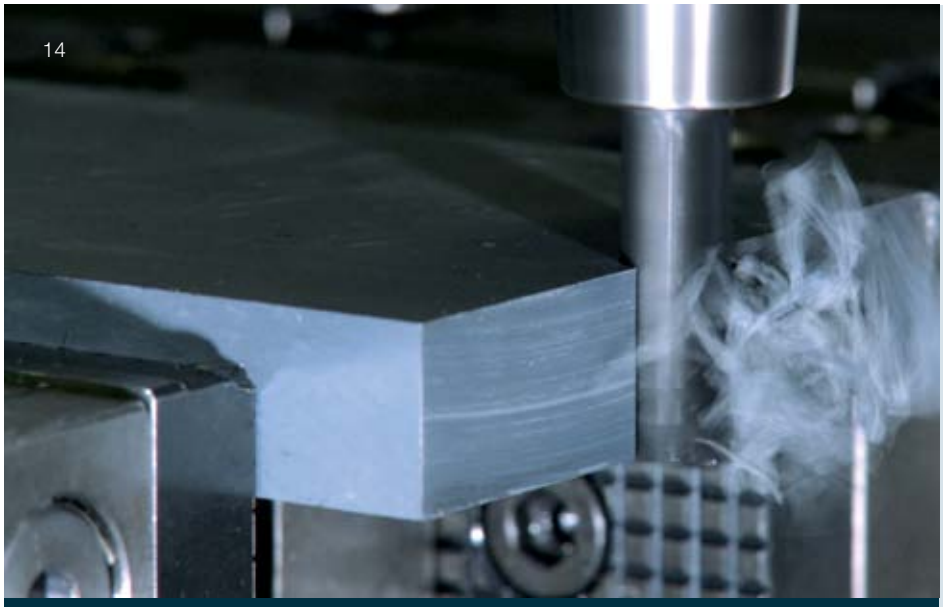
Just under 50 years ago, Yvon Belin first began concentrating on the special needs of the glasses manufacturers based in "Plastic Valley" around Oyonnax in the French Jura Mountains. Then as now, the goal was to enable customers to realize new quality standards with the aid of specialized high-precision solid carbide tools. "LMT Belin has maintained the necessary key expertise," says Rechtziegler.

LMT Belin specially designed these tools for eyewear production at IC! Berlin.

Special expertise for special industries

Machining only plays a minor role today in the high-volume production of spectacle frames. Modern injection moulding techniques allow near net shape manufacturing. Only manufacturers of prototypes and premium eyewear with high levels of design diversity still rely on the conventional mechanical machining of components. LMT Belin developed form and router milling cutters for ic! Berlin especially designed for eyewear production. This example also illustrates the LMT Group philosophy, as Martin Danielczick, manager of the Segment Plastics and Composites at LMT Tool Systems, makes clear: "When industry specialists focus on the machining of composites and plastics, it usually involves machining jobs in the automotive, aerospace or wind power industries. They also play a major role at LMT. As a multiple specialist, however, we are also active in other sectors – and then with special expertise. The glasses industry benefits from that."

→ **www.ic-berlin.de**



Machining of composites

A compressed solution

// How can you avoid damage to components resulting from delamination? Here LMT is relying on compression technology and compression tools.

The main challenge in machining fibre-reinforced composites is delamination. Different kinds of damage can result depending on the material and machining technique involved. Glass or carbon fibres can literally "break out" of the brittle matrix material during machining, especially along the edges of the workpiece, where they are then left protruding from the material. "The best solution to avoid delamination is the compression technology", explains

Composite instrument panels

Precision for the high-end market

// Perfection in every detail is becoming increasingly important in interior fittings for automobiles. Instrument panels, for example, are expected to have a top-quality look and feel. This presents enormous challenges for the specialized suppliers who produce these parts. These already begin with the selection of the right materials. Fortunately, the composites experts at LMT Tool Systems are always there to help when it comes to finding appropriate precision tools.

So-called sandwich materials are frequently to be found under the high-quality surfaces of vehicle interiors. Various layers – for example, glass-fibre reinforced polypropylene or polyurethane (PU) foam – and a sprayed surface coating together form a high-quality material that meets all the requirements with regard to design and passenger safety. At the same time, these materials make the perfect machining of every design detail a real challenge.

Focus on burrs

Each layer responds differently to the blade of the cutting tool. Additionally, glass-fibre reinforced composite materials have a negative impact on tool life and therefore also influence machining quality. Heiko Simonis, application engineer at LMT says on this point: "The material can respond rather sensitively during the machining process. Small chips very easily form on the surface, which then look like burrs on the cut edge. Of course, it is important

Composite Excellence

The future is lightweight

// Lightweight designs are the thing of the future: new components, new combinations of materials and new processing techniques are bringing about fundamental changes in manufacturing industry.

Martin Danielczick, Manager Segment Plastics and Composites.
The principle that compression tools use is a combination of upcut and downcut. During machining the tool exerts pressure on the workpiece from both directions, thereby literally "compressing" it.

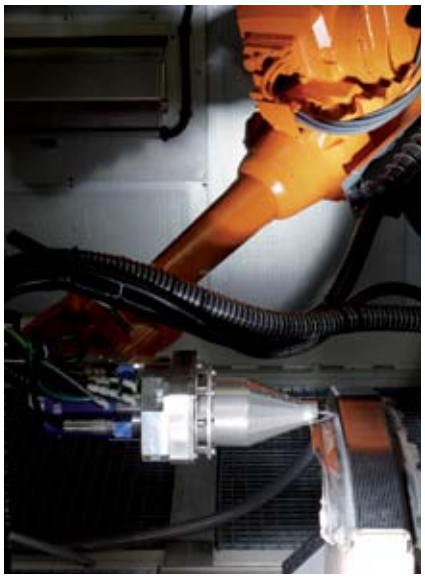
High end solution from LMT

The underlying principle becomes extremely clear when you take a closer look at LMT's high-end finishing tool, the DFC Compression Mill. The tool has a defined compression point. Below that point it exerts upward pressure, above that point it pushes chips downward. The push and pull forces are balanced so that the workpiece is "compressed" and "peeling" prevented.

to avoid this undesirable effect." At the same time, the LMT tool experts are constantly looking at ways of improving tool life: the machining of the different layers calls for a particularly sharp tool with cutting edges that do not go blunt even after long periods of use.

LMT develops perfectly tailored solutions

Finding the optimum tool therefore involves answering a whole series of design questions – for example, about the best coating and blade geometry.
"This is where the know-how of the composites experts at LMT Belin really pays off. They contribute their experience and knowledge to every project and perfectly match the tools to the complex sandwich material and its geometry," explains Martin Danielczick of LMT Tool Systems. "Composite materials are the materials of the future. However, the requirements are always different, for example, depending on the material matrix."



CFRP FINISHING WITH ROBOTS

Composite materials like CFRP are on the threshold of being used in mass production. This is already changing the demands being made on production technology: high-volume manufacturing is receiving more attention in this field than one-off products. KraussMaffei Technologies has developed a solution for CFRP finishing. LMT composites experts are also involved as tool partners. The automated robot cell produces significantly better results in all relevant parameters – such as cycle time and component quality – than would be possilbe, for example, using water jet technology.

Video: High-speed film of composites machining at KraussMaffei

COMPOSITE EXCELLENCE

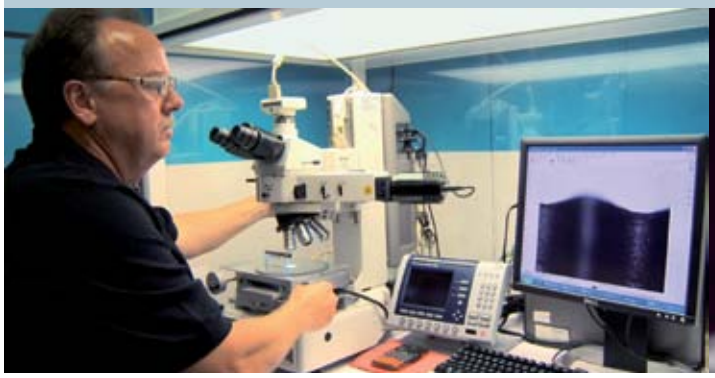
LMT has unique expertise in the machining of new materials and is pooling its know-how in this forward-looking market as part of the Composite Excellence initiative. Working as a development partner, LMT can offer users all the experience it has available within the Group and provide a broad range of tools for various industries. The initiative is supported by the two LMT competence centres for the processing of composites and plastics: LMT Onsrud, USA, and LMT Belin, France.

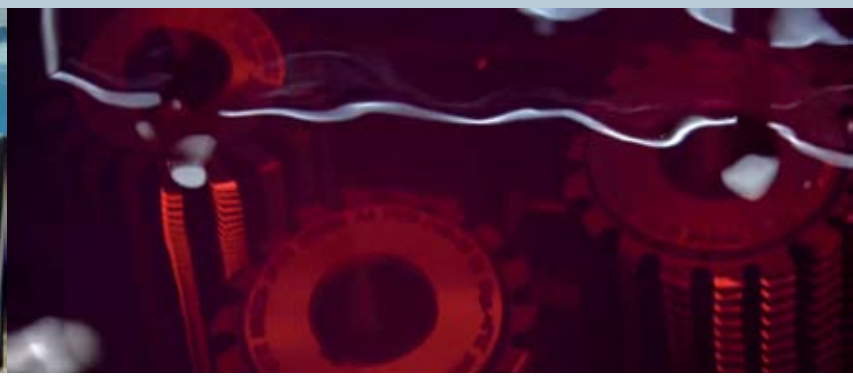
Weblink: Tools for composites machining

Coating development

Peripheral but central

// LMT tool experts have always been at the cutting edge of coating development – from the world's first nanostructured tool coating to Protec, the first coating for thread rollers. Their efforts have resulted in tool innovations that enable sustainable improvements in the machining of today's high-tech materials. But why is the tool manufacturer's expertise so important?





New coatings are perfectly tailored to the application at LMT.

Essentially, three factors determine the performance of a tool: its coating, its blade geometry and its substrate. While developments in the last two areas only facilitate small improvements, innovative coatings enable real performance increases, for example, in tool life. Ultimately, however, the interplay of all three factors is decisive, as the engineer Philipp Immich, head of R&D on cutting materials and coatings at LMT Fette, makes clear: "Materials, geometries and tool coatings must be ideally matched to the respective application. And who knows more about the interaction between these different factors than a tool manufacturer?"

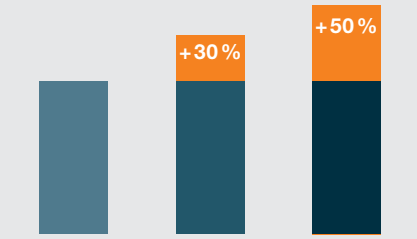
Precisely targeted improvements of production processes

This development process eventually creates innovative coatings that do not only improve the performance of tools and with it the efficiency of the entire production process, but are also perfectly adapted to one specific area of application. The demands made on these coatings can differ quite considerably: while Protec has to protect the entire thread roller against the enormous pressures resulting from a non-cutting technique, other coatings only need to shield the blades of a cutter.

LMT coating centres in major markets

LMT's know-how as a multiple specialist is clearly indispensable. Gear-cutting, thread-forming, die and mould making and the machining of composite materials – LMT companies have very different competences that are essential for the perfectly tailored development of coatings and tools. The same applies to reconditioning. Precision tools are high-tech products. How cost-effective they are depends very largely on how often they can be reconditioned once wear and tear begins to have an effect. And, of course, their performance has to be exactly the same again after reconditioning. That's why the original coating developed by LMT experts has to be applied. LMT ensures that this is possible by maintaining its own coating centres in all major markets.

COATING INCREASES PRODUCTIVITY



Video: Coatings – higher productivity guaranteed

Nanosilver: Up to 200% longer tool life

PDF

Roughing, finishing, thread-cutting – practically the entire range of tool applications is used in the production of crankshafts. At EMO 2011, LMT alliance partner Boehlerit is presenting Nanosilver, a new cutting material specially designed for machining these complex components. It involves three new carbide substrates covered by a nanostructured silvery coating. This makes them extremely heat-resistant and at the same time substantially reduces the tendency towards thermal cracking. Tool life is increased by at least 40% for the dry machining of steel materials and even 200% in certain applications. That means tools need to be changed less frequently, thereby reducing the particularly expensive set-up times involved in crankshaft machining.

TeraSpeed: High-speed machining of cast material

Video

LMT Fette is setting new performance records by applying the latest Boehlerit coating to its face-milling cutters for machining cast materials. TeraSpeed, an aluminium titanium nitride coating system, is created using chemical vapour deposition (CVD method). CVD provides extremely high adhesion and a uniform distribution of coating thickness on cutting and open areas. The coating itself is exceptional because of its hardness of roughly 3,500 HV. Additionally, an aluminium content of over 90% guarantees a high thermal resistance of up to 1,100 degrees Celsius – 200 degrees more than comparable coatings. This facilitates signicantly higher cutting speeds: performance increases by 100% in face-milling applications and even by 200% in step-milling applications. Users therefore save considerable time and money.

Nanomold Gold: Boosting performance in die and mould making

One of the largest problems when machining with WPR-type ball nose copy inserts is the different cutting speeds at the centre and the periphery of the insert. LMT Kieninger, the die and mould making specialists within the LMT Group, have developed a new kind of coating structure that promises substantial performance increases: Nanomold Gold combines individually adjustable layers and layer thicknesses. This makes it possible to use a top layer that is ideally suited to high cutting speeds in combination with a core coating that also maintains its properties at low peripheral speeds. In order to guarantee the durability of the coating, the first layer is always an adhesion layer that forms a soft transition between the substrate and the coating system. This enables Nanomold Gold to offer a high level of chemical and thermal stability and very good protection against abrasive wear. In practical use, average wear-land width is almost halved by the new coating. In steels up to 50 HRC Nanomold Gold achieves tool life improvements of at least 30%. Another advantage is the very uniform progression of wear along the cutting edge, which above all offers a high level of process reliability in machining.

PDF

Interview

“Tool coatings boost performance”

// The development of precision tools is now practically inconceivable without coatings. What are the advantages for users? Where is this development heading?
We asked Dr. Marcus Morstein, head of Research & Development at Swiss coating experts PLATIT AG, for his views.

→ Which areas require special emphasis when you’re developing coatings?

Fundamentally, users have many different requirements. New coatings therefore need to have a certain universal application. Customers have become much more demanding and better informed in recent years: two or three layers ought to cover the entire range of necessary applications, but should not make any compromises on performance. However, since these coatings differ from user to user, it must be possible to adjust the coating machine flexibly.

→ In your opinion, what are the special advantages of tool coatings?

The main focus is clearly on increasing productivity. The higher cutting speeds and feed rates that can be achieved with the aid of new coatings make an important contribution to maintaining competitiveness, especially in high-wage countries. The prolonged service lives of coated tools are another positive effect. Tool coatings also have a special significance in the machining of new materials. In the automotive sector, for example, these materials can reduce weight, lower fuel consumption or increase crash resistance. Additionally, the aerospace industry is finding more and more applications for nickel-based materials, which are relatively difficult to process. In addition to improvements in tool substrates and geometries, coatings also play a key role here.

→ What kinds of productivity gains do you consider realistic?

If a new generation of coating is applied to an existing substrate, it must boost productivity by between 20 and 30% compared to its predecessor because users are often unwilling to change their production setup for only minor increases.
On rare occasions, a new coating combined with a new cutting material can achieve efficiency increases of up to 50%, but then it is possible to speak of a performance revolution.

→ What future do you see for coatings in the tool industry? Where is development heading?

Their many advantages make coatings an absolutely key technology. Tool manufacturers are likely to increasingly integrate coating technology into their in-house structures, since they can then develop better adapted coatings. These represent unique selling points on the market and frequently offer higher performance than the available standard coatings. In order to enable toolmakers to develop special coatings for their customers, however, equipment manufacturers will also have to open up their platforms – ideally as part of an open-source strategy. The technological challenge here lies in dealing with new generations of cutting material substrates. Ceramic materials, for example, offer interesting opportunities beyond carbide, but are sometimes not so easy to coat. In any event, the competition between different PVD and CVD coating technologies will ensure that innovation in tool coatings will most certainly not come to a halt!

→ Dr. Morstein, thank you for this interview.

→ www.platit.com

17000 ITEMS AT A GLANCE

// The new catalogue from LMT Tool Systems GmbH is comprehensive, user-friendly and clearly structured.

For a long time now the main catalogue has been an important and useful reference work and tool for the customers of LMT Tool Systems GmbH. The latest edition offers a number of important innovations to make it easier to get the best use out of the catalogue. Reorganized product overviews, clear pictograms and application recommendations facilitate the selection of the right tool.

Users will quickly find the tool they need among a total of 17,000 products for general machining. Specific segment catalogues with extensive technical explanations and information will follow. They underline the LMT Group's competence as a multiple specialist and round off the new catalogue concept.

Martin Heckel, head of Product Management at LMT Tool Systems GmbH, explains: "The restructured main catalogue forms the basis for the fields of milling, turning, drilling, thread-making and clamping. Our primary goal in choosing this design was to guarantee a user-friendly structure that enables customers to make the best use of the catalogue." The printed version also serves as the basis for the online catalogue, which will soon become accessible.

The new main catalogue is organized on the basis of different areas of application.

PDF: Catalogue

LMT • TOOLS

Contact addresses

Brasilien / Brazil
LMT Boehlerit Ltda.
Alameda Caiapós, 693
Centro Empresarial
Tamboré
06460-110 – Barueri
São Paulo
Telefon +55 11 55460755
Telefax +55 11 55460476
lmtvendas@lmt.com.br

China
LMT China Co. Ltd.
No. 8 Phoenix Road,
Jiangning Development Zone
211100 Nanjing
Telefon +86 25 52128866
Telefax +86 25 52106376
lmt.cn@lmt-tools.com

Deutschland / Germany
LMT Tool Systems GmbH
Heidenheimer Str. 84
73447 Oberkochen
Telefon +49 7364 9579-0
Telefax +49 7364 9579-8000
lmt.de@lmt-tools.com

Frankreich / France
LMT Belin France S.A.S.
01590 Lavancia
Telefon +33 474 758989
Telefax +33 474 758990
lmt.fr@lmt-tools.com

Großbritannien und Irland / United Kingdom
LMT UK Ltd.
5 Elm Court
Copse Drive
Meriden
CV5 9RG
Telefon +44 1676 523440
Telefax +44 1676 525379
lmt.uk@lmt-tools.com

Indien / India
LMT (India) Private Limited
Old No. 14, New No. 29,
IInd Main Road
Gandhinagar, Adyar
Chennai – 600 020
Telefon +91 44 24405136/137
+91 44 42337701/03
Telefax +91 42337704
lmt.in@lmt-tools.com

Italien / Italy
LMT ITALY S.r.l.
Via Bruno Buozzi 31
20090 Segrate (MI)
Telefon +39 02 2694971
Telefax +39 02 21872422
lmt.it@lmt-tools.com

Kanada / Canada
LMT USA Inc.
1081 S. Northpoint Blvd.
Waukegan, IL 60085
Telefon +1 847 6933270
Telefax +1 847 6933271
lmt.us@lmt-tools.com

Korea
LMT Korea Co. Ltd.
Room #1212, Anyang Trade Center
1107 Bisan-Dong, Dongan-Gu,
Anyang-Si,
Gyeonggi-Do, 431-817,
South Korea
Telefon +82 31 3848600
Telefax +82 31 3842121
lmt.kr@lmt-tools.com

Mexiko / Mexico
LMT Boehlerit S.A. de C.V.
Ave. Acueducto No. 15
Parque Industrial
Bernardo Quintana
76246 El Marqués, Querétaro
Telefon +52 442 2215706
Telefax +52 442 2215555
info@lmt.com.mx

Österreich / Austria
Boehlerit GmbH & Co. KG
Werk-VI-Straße
8605 Kapfenberg
Telefon +43 3862 300-0
Telefax +43 3862 300793
info@boehlerit.com

Polen / Poland
LMT Boehlerit Polska Sp. z.o.o.
ul. Wysogotowska 9
62-081 Przezmierowo
Telefon +48 61 6512030
Telefax +48 61 6232014
lmt@lmt-polska.pl

Rußland/Russia
LMT Tools
Kotlyakowskaya str. 3
115201 Moscow
Telefon +7 495 510-1027
Telefax +7 495 510-1028
info@lmt-russia.ru

Singapur / Singapore
LMT Asia PTE LTD.
1 Clementi Loop 04-01
Clementi West District Park
Singapur 12 9808
Telefon +65 64 624214
Telefax +65 64 624215
sales@lmta.com.sg

Spanien und Portugal / Spain and Portugal
LMT Boehlerit S.L.
C/. Narcis Monturiol 11-15
08339 Vilassar de Dalt
Barcelona
Telefon +34 93 7507907
Telefax +34 93 7507925
lmt.es@lmt-tools.com

Tschechische Republik und Slowakei/ Czech Republic and Slovakia
LMT Czech Republic s.r.o.
Dusikova 3
63800 Brno-Lesná
Telefon +420 548 218722
Telefax +420 548 218723
lmt.fette@iol.cz

Türkei / Turkey
BÖHLER Sert Maden
ve Takim Sanayi ve Ticaret A.Ş.
Ankara Asfalti Üzeri No. 22,
Kartal 34873
Istanbul
Telefon +90 216 306 65 70
Telefax +90 216 306 65 74
bohler@bohler.com.tr

Ungarn / Hungary
LMT-Boehlerit Kft
Kis-Duna U. 6
2030 Erd
Po Box # 2036 Erdliget Pf. 32
Telefon +36 23 521910
Telefax +36 23 521919
lmt.hu@lmt-tools.com

USA
LMT USA Inc.
1081 S. Northpoint Blvd.
Waukegan, IL 60085
Telefon +1 847 6933270
Telefax +1 847 6933271
lmt.us@lmt-tools.com

LMT Belin France S.A.S.
01590 Lavancia
Frankreich
Telefon +33 474 758989
Telefax +33 474 758990
info@lmt-belin.com
www.lmt-belin.com

LMT Fette Werkzeugtechnik GmbH & Co. KG
Grabauer Straße 24
21493 Schwarzenbek
Deutschland
Telefon +49 4151 12-0
Telefax +49 4151 3797
info@lmt-fette.com
www.lmt-fette.com

LMT Kieninger GmbH
Vogesenstraße 23
77933 Lahr
Deutschland
Telefon +49 7821 943-0
Telefax +49 7821 943 213
info@lmt-kieninger.com
www.lmt-kieninger.com

LMT Onsrud LP
1081 S. Northpoint Blvd.
Waukegan, IL 60085
USA
Telefon +1 847 3621560
Telefax +1 847 4731934
info@lmt-onsrud.com
www.lmt-onsrud.com

in alliance

Bilz Werkzeugfabrik GmbH & Co. KG
Vogelsangstraße 8
73760 Ostfildern
Deutschland
Telefon +49 711 348010
Telefax +49 711 3481256
info@bilz.com
www.bilz.com

Boehlerit GmbH & Co. KG
Werk-VI-Straße
8605 Kapfenberg
Österreich
Telefon +43 3862 300-0
Telefax +43 3862 300793
info@boehlerit.com
www.boehlerit.com

LMT Technology Group

BELIN
FETTE
KIENINGER
ONSRUD

in alliance

BILZ
BOEHLERIT

All contact data is also available online.

Publisher: LMT GmbH & Co. KG, Heidenheimer Straße 84, 73447 Oberkochen, Germany, Phone +49 7364 95 79 0, V.i.S.d.P.: Volker Reinsch, vreinsch@lmt-tools.com | Printed in Germany